

Caries Management by Risk Assessment (CAMBRA®)

Humanitas-Job Corps
Webinar
September 11, 2019

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About Your Instructor



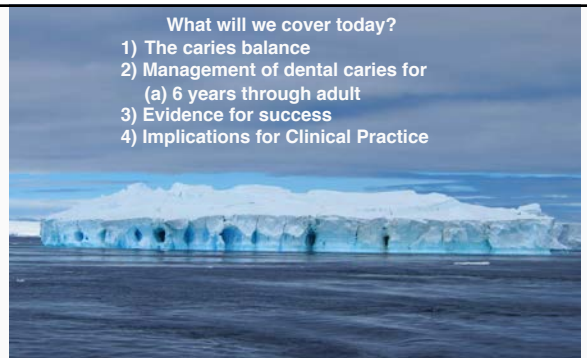
- ◆ John Featherstone, Professor Emeritus of Preventive and Restorative Dentistry, and Dean Emeritus of UC San Francisco's School of Dentistry
- ◆ Involved with research and clinical applications of this research for dental decay prevention for 45 years
- ◆ Published over 300 articles and book chapters

Disclosure

- ◆ I have no personal financial interest in any company relevant to this presentation.
- ◆ I have consulted for, or have done research funded or supported by:
Arm and Hammer, Beecham, Cadbury, GSK, KaVo, Liberty Dental Plan, Nobio, Novamin, Omnii Oral Pharmaceuticals, Oral B, Phase Diagnostics, Philips Oralcare, Procter and Gamble, 3M ESPE Preventive Care, Wrigley, and the National Institutes of Health.
- ◆ CAMBRA® is a licensed trade mark of the University of California (UC). Synergyx has developed a caries management software under license to UC.

What will we cover today?

- 1) The caries balance
- 2) Management of dental caries for
(a) 6 years through adult
- 3) Evidence for success
- 4) Implications for Clinical Practice



What is Caries Risk?

- ◆ Caries Risk is the likelihood of a person having new or extended tooth decay in the coming months or years
- ◆ We recommend assessing caries risk as low, moderate, high or extremely high

What is the Caries Risk of Cynthia Lee?



- ◆ 17 year old female
- ◆ No new caries lesions in the last 5 years
- ◆ No symptoms of salivary dysfunction (dry mouth), no medications with salivary side effects
- ◆ Not a frequent snacker
- ◆ Brushes 2x daily with F toothpaste
- ◆ Very health conscious

What is the Caries Risk of Mary Smith?



- ◆ 15 year old female
- ◆ Several lesions radiographically into dentin
- ◆ Symptoms of salivary dysfunction (dry mouth), taking anti-anxiety medications and other medications
- ◆ Frequent snacker
- ◆ Recreational drug user
- ◆ F toothpaste 1X daily

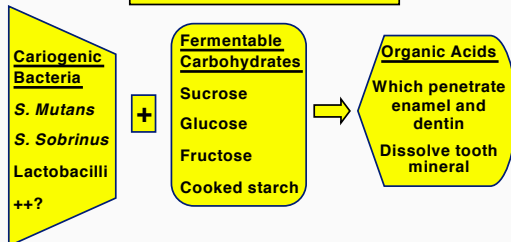
Caries Management by Risk Assessment (CAMBRA®):

Proposed in 2003
Published for use in practice in 2007
Used at UCSF since 2003
Updated and published in CDAJ 2019

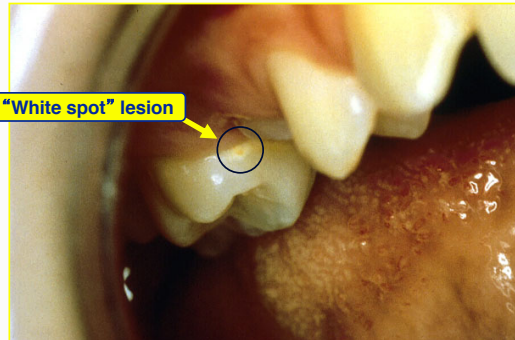
Evidence now validates:

- ◆ caries risk assessment tools
- ◆ combined chemical therapy
- ◆ Caries Management by Risk Assessment

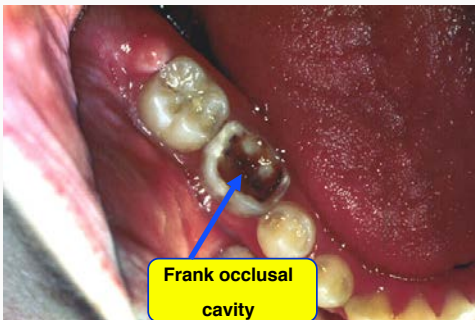
Demineralization:- Step 1



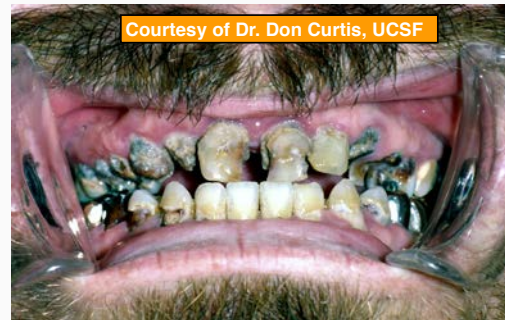
"White spot" lesion



Frank occlusal cavity



Courtesy of Dr. Don Curtis, UCSF



The Caries Balance

Pathological Factors

- Acid-producing bacteria
- Frequent eating/drinking of fermentable carbohydrates
- Sub-normal saliva flow and function-Hyposalivation

Protective Factors

- Saliva flow and components
- Fluoride, Calcium, Phosphate: remineralization
- **Antibacterials**:- chlorhexidine, silver DF, hypochlorite, New?

Caries

No Caries

Featherstone, Community Dent Oral Epidem, 1999

The Caries Balance

Pathological Factors

- **Acid-producing bacteria**
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Caries

No Caries

Acid Producing Bacteria

Acidogenic – produce acid from carbohydrates

Aciduric – can live in acid

- ◆ Mutans streptococci – *S. mutans*, *S. sobrinus*
- ◆ *Lactobacillus* species – *L. casei* and *fermentum*
- ◆ *Bifidobacteria*
- ◆ *Veillonella*
- ◆ *Scardovia wiggsiae*
- ◆ *Actinomyces* species
- ◆ Any acidogenic/aciduric bacteria
- ◆ Biofilm is a cooperative city

Biofilm Modification is necessary as part of our therapy for high bacterial challenge individuals. Caries is a transmissible bacterial infection.

Biofilm dysbiosis leads to caries progression



The Caries Balance

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- Acid-producing bacteria
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Protective Factors

- Saliva flow and components
- Fluoride, Calcium, Phosphate: remineralization
- **Antibacterials**:- chlorhexidine, silver DF, hypochlorite, New?

Caries

No Caries

Cariogenic foods contain fermentable carbohydrates such as sucrose, glucose, fructose and cooked starch



Pathological Factors

- ◆ **Cariogenic (ACID PRODUCING bacteria):** mutans streptococci (*S. mutans* and *S. sobrinus*), lactobacillus species and several others
- ◆ **Frequency of ingestion of fermentable carbohydrates:** sucrose, glucose, fructose, cooked starch
- ◆ **Reduced salivary function (medication induced; radiation therapy; disease; genetic) - HYPOSALIVATION**



Hyposalivation: Male, 55 years old, before radiation to the head and neck for cancer treatment. Causes saliva flow and function to be cut by at least 90%

Same male, after radiation to the head and neck. Six months later, showing rampant decay and massive destruction of the teeth



The Caries Balance

Pathological Factors

- Acid-producing bacteria
- Frequent eating/drinking of fermentable carbohydrates
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Protective Factors

- Saliva flow and components
- Fluoride, Calcium, Phosphate: remineralization
- **Antibacterials:-** chlorhexidine, silver DF, hypochlorite, New?

Caries

No Caries

The Caries Balance

Pathological Factors

- Acid-producing bacteria
- Frequent eating/drinking of fermentable carbohydrates
- Sub-normal saliva flow and function-Hyposalivation

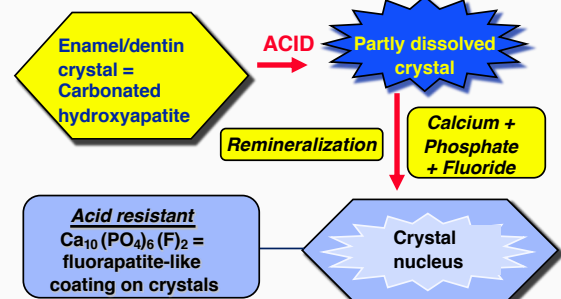
Protective Factors

- Saliva flow and components
- Fluoride, Calcium, Phosphate: remineralization
- **Antibacterials:-** chlorhexidine, silver DF, hypochlorite, New?

Caries

No Caries

"White spot" lesion



Fluoride works primarily via topical (surface) mechanisms
(Fluoride in water, foods, beverages, products)

- ◆ Fluoride inhibits demineralization
- ◆ Fluoride enhances remineralization
- ◆ Fluoride can inhibit plaque bacteria



Brush at least 2X daily with fluoride toothpaste



Brushing at least twice daily with a fluoride-containing toothpaste is one of the most effective ways to control dental decay. Curnow, Pine et al., 2002.

High bacterial challenge overcomes the therapeutic effects of fluoride.

Caries Research

Original Paper

Caries Res 2010;44:323–331
DOI: 10.1159/000337490

Received November 24, 2009
Accepted after revision April 26, 2010
Published online July 1, 2010

Preventive Effect of High-Fluoride Dentifrice (5,000 ppm) in Caries-Active Adolescents: A 2-Year Clinical Trial

A. Nordström D. Birkhed

- 5000 ppm F vs 1450 ppm F (as NaF) toothpaste
- Caries incidence and caries progression
- Compliance assessed
- Prevented fraction 40%: 5,000 ppm versus 1450 ppm F
- Caries still progressed in many, even with high concentration fluoride

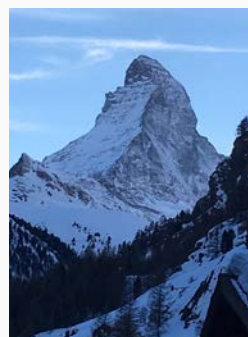
High concentration fluoride products (5,000 ppm F) for high risk patients 6 years through adult. Also proven effective for root caries.



Fluoride Varnish for High Caries Risk of All Ages

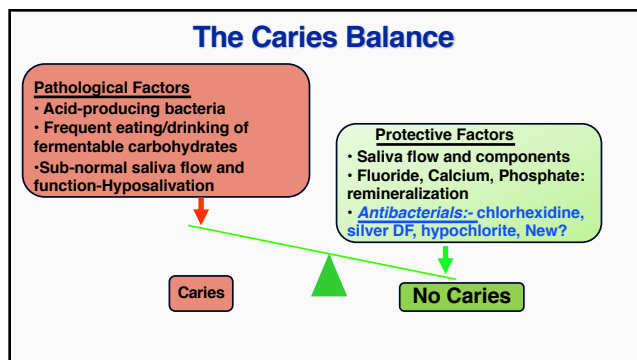
Example:

White Varnish – 3M ESPE Preventive Care



Fluoride alone is not enough for high risk patients

Biofilm modification is necessary



Caries Research

Original Paper

Caries Res 2012;46:118-129
DOI: 10.1159/000337241

Received:
Accepted:
Published:

Caries Res, 2012
Study conducted 1999-2005

A Randomized Clinical Trial of Anticaries Therapies Targeted according to Risk Assessment (Caries Management by Risk Assessment)

J.D.B. Featherstone J.M. White C.I. Hoover M. Rapozo-Hilo J.A. Weintraub
R.S. Wilson L. Zhan S.A. Gansky
University of California, San Francisco, Calif., USA

Chlorhexidine Gluconate 0.12%, 6 years through adult.
5-10 ml, daily for 1 week every month reduces mutans streptococci markedly in high caries risk patients. 6 years through adult. Modifies the biofilm.

Repeat every month.



Minimal Intervention Dentistry
Minimally Invasive Dentistry
Optimal Intervention Dentistry

1. Caries risk assessment
2. Chemical therapy
3. Minimally invasive restorative dentistry to conserve tooth structure
4. Patient compliance

Featherstone and Doméjean, Br. Dent. J., 2012

Caries Management Step by Step (CAMBRA®) 6 year through adult

- ◆ Dental/medical history
- ◆ Clinical exam
- ◆ Detect caries lesions **early enough to reverse or prevent progression**
- ◆ **Assess caries risk**
- ◆ **Treatment plan including chemical therapy**
- ◆ **Use fluoride and/or antibacterial therapy based on observations**
- ◆ **Use minimally invasive restorative procedures to conserve tooth structure**
- ◆ Recall and review
- ◆ Compliance is critical



Putting into practice the results of many years of research.

“Caries Management by Risk Assessment”

October, November 2007. On line, free

California Dental Association Journal based upon the “Caries Balance”

<http://www.cdafoundation.org/education/resources-library>

Caries Risk Assessment

Risk Levels

- ◆ Low
- ◆ Moderate
- ◆ High
- ◆ Extreme (High risk plus hyposalivation)



UCSF: 6 Year – Adult Caries Risk Assessment Outcomes

CRA STUDY

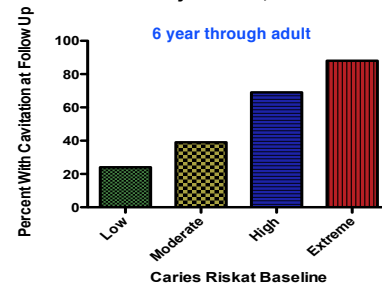
California Dental Association Journal: 30(10), 2011



Validation of the CDA CAMBRA Caries Risk Assessment — A Six-Year Retrospective Study

Sophie Domejean, Joel M White, John D Featherstone

% Cavitation at Follow Up (N=2,571) Domejean et al, 2011



CAMBRA®

Caries Management by Risk Assessment

A Comprehensive Caries Management Guide for Dental Professionals

California Dental Association Journal Updated forms and evidence base. January 2019.

CAMBRA guide. On line. Download free.

cdafoundation.org/CAMBRA

CRA update 6 year-adult

CAMBRA®

J California Dent Assoc. January 2019

cda.org/CAMBRA1

Caries risk component		Check if	
Disease Indicators		Yes	
1. New caries on denture(s) (radiographically)			
2. New white spot lesions on enamel surface			
3. New non-carious lesions in enamel (radiographically)			
4. Existing restorations in last 3 years (new patient) or the last visit (return of patient)			
Biological or environmental risk factors		Check if	
1. Salivary function, normal - Not currently available		Yes	
2. Frequent snoring (≥ 3 times daily)			
3. Frequent dry mouth			
4. Reduced salivary function (measured low flow rate)			
5. Reduced salivary function (measured low flow rate)			
6. Dental pain and discomfort			
7. Restorations along jaw			
8. Unusual tooth color			
9. Orthodontic appliances			
Protective factors		Check if	
1. Fluoridated water		Yes	
2. F mouthwash, once a day			
3. F toothpaste, PK daily or more			
4. 2000 ppm F toothpaste			
5. F varnish last 6 months			
6. 0.05% fluoride toothpaste, fluoride daily			
7. 0.12% chlorhexidine gluconate mouthwash daily 7 days weekly			
8. Normal salivary function			
Final Score:		Column 1	Column 2
Yes in column 1 indicates high or extreme risk			
Yes in column 2 and 3, consider the caries balance			
Hyposalivation plus high risk factors = extreme risk			

CRA update: 6 year-adult-January 2019
cda.org/CAMBRA1

Caries risk component	Column 1	Column 2	Column 3
Disease Indicators (Clinical observations)	Check if Yes		
1. New cavities or lesion(s) into dentin (radiographically)			
2. New white spot lesions on smooth surfaces			
3. New non-cavitated lesion(s) in enamel (radiographically)			
4. Existing restorations in last 3 years (new patient) or the last year (patient of record)			

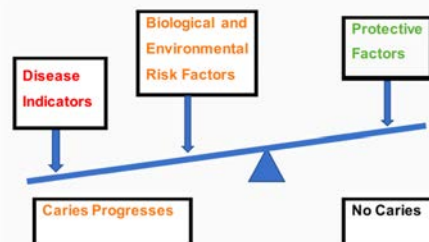
CRA update: 6 year-adult-January 2019

Caries risk component	Column 1	Column 2	Column 3
Biological or environmental risk factors		Check if Yes	
1. 1. Cariogenic bacteria – not currently available			
2. Heavy plaque on the teeth			
3. Frequent snacking (>3 times daily)			
4. Hyposalivatory medications			
5. Reduced salivary function (by measured low flow rate)*			
6. Deep pits and fissures			
7. Recreational drug use			
8. Exposed tooth roots			
9. Orthodontic appliances			

CRA update: 6 year-adult-January 2019

Caries risk component	Column 1	Column 2	Column 3
Protective factors			Check if Yes
1. Live, works, goes to school in a fluoridated water area			
2. F toothpaste once a day			
3. F toothpaste 2X daily or more			
4. 5000 ppm F toothpaste			
5. F varnish last 6 months			
6. 0.05% sodium fluoride mouthrinse daily			
7. 0.12% chlorhexidine gluconate mouthrinse daily 7 days monthly			
8. Normal salivary function			
Final Score:			
Yes in column 1 indicates high or extreme risk			
Yes in columns 2 and 3: consider the caries balance			
*Hyposalivation plus high risk factors = extreme risk			

The Modified Caries Balance for Caries Risk Assessment in Practice



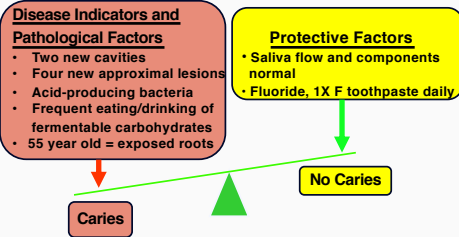
Caries Risk - Joe Cornish



- ◆ 55 year old male
- ◆ Two new cavities since last visit two years ago
- ◆ Four new approximal lesions by radiograph
- ◆ Exposed root surfaces
- ◆ Heavy plaque on teeth
- ◆ Bacteria - likely high
- ◆ Frequent snacker – truck driver
- ◆ No symptoms of dry mouth
- ◆ No hyposalivatory meds
- ◆ 1X daily F toothpaste?

Caries risk component	Column 1	Column 2	Column 3
Disease Indicators	Check if Yes		
1. New cavities or lesion(s) into dentin (radiographically)	YES		
2. New white spot lesions on smooth surfaces			
3. New non-cavitated lesion(s) in enamel (radiographically)	YES		
4. Existing restorations in last 3 years (new patient) or the last year (patient of record)			
Biological or environmental risk factors		Check if Yes	
1. Cariogenic bacteria quantity-Not currently available		YES	
2. Heavy plaque on the teeth		YES	
3. Frequent snacking (>3 times daily)		YES	
4. Hyposalivatory medications			
5. Reduced salivary function (measured low flow rate)*			
6. Deep pits and fissures			
7. Recreational drug use			
8. Exposed tooth roots		YES	
9. Orthodontic appliances			
Protective factors			Check if Yes
1. Fluoridated water			YES
2. F toothpaste once a day			
3. F toothpaste 2X daily or more			
4. 5000 ppm F toothpaste			
5. F varnish last 6 months			
6. 0.05% sodium fluoride mouthrinse daily			
7. 0.12% chlorhexidine gluconate mouthrinse daily 7 days monthly	2	3	YES
8. Normal salivary function			
Final Score:	Column 1	Column 2	Column 3

The Caries Balance-High Risk



Therapy for High Caries Risk: 6 year - Adult

Fluoride varnish Initially and at each recall/wellness (4X year)

0.12% Chlorhexidine rinse, 10 ml once daily, One week a month

Brushing 2X daily with 5,000 ppm F Toothpaste
Recall 3-4 months. Continue therapy at least one year
Liberty 2 recalls and 2 wellness visits in 12 months

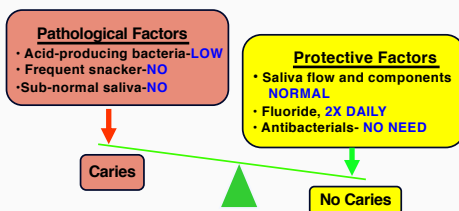
Caries Risk - Cynthia Lee



- 17 year old female
- No new caries lesions in the last 5 years
- Bacteria?
- Excellent oral hygiene
- Not a frequent snacker
- No symptoms of salivary dysfunction
- no medications with salivary side effects
- 2X daily F toothpaste

Disease Indicators	Check if Yes	
1. New cavities or lesion(s) into dentin (radiographically)		
2. New white spot lesions on smooth surfaces		
3. New non-cavitated lesion(s) in enamel (radiographically)		
4. Existing restorations in last 3 years (new patient) or the last year (patient of record)		
Biological or environmental risk factors	Check if Yes	
1. Cariogenic bacteria quantity: Not currently available		
2. Heavy plaque on the teeth		
3. Frequent snacking (>3 times daily)		
4. Hyposalivatory medications		
5. Reduced salivary function (measured low flow rate)*		
6. Deep pits and fissures		
7. Recreational drug use		
8. Exposed tooth roots		
9. Orthodontic appliances		
Protective factors	Check if Yes	
1. Fluoridated water		
2. F toothpaste once a day		
3. F toothpaste 2X daily or more		
4. 5000 ppm F toothpaste		
5. F varnish last 6 months		
6. 0.05% sodium fluoride mouthrinse daily		
7. 0.12% chlorhexidine gluconate mouthrinse daily 7 days monthly		
8. Normal salivary function		
Column 1	Column 2	Column 3

The Caries Balance - Low Risk



Therapy for Low Caries Risk: 6 year-Adult

- Maintain 2 x daily fluoride toothpaste brushing and other good habits.
- Recall 12 months.
- Liberty: During first 12 months 2 recalls and 1 wellness visit, Thereafter 1 recall and 1 wellness each 12 months. F varnish 2x year



What is the Caries Risk of Mary Smith?

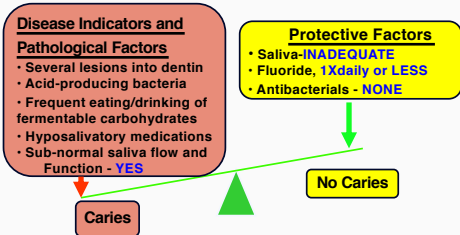


- ◆ 15 year old female
- ◆ Several lesions into dentin
- ◆ Bacteria? – heavy plaque
- ◆ Symptoms of salivary dysfunction (dry mouth), taking anti-anxiety medications and other hyposalivatory medications
- ◆ Frequent snacker
- ◆ Recreational drug user
- ◆ F toothpaste 1X daily?

Caries risk component		Check if Yes	
Disease Indicators			
1. New cavities or lesion(s) into dentin (radiographically)	YES		
2. New white spot lesions on smooth surfaces	YES		
3. New non-cavitated lesion(s) in enamel (radiographically)	YES		
4. Existing restorations in last 3 years (new patient) or the last year (patient of record)			
Biological or environmental risk factors		Check if Yes	
1. Cariogenic bacteria quantity: Not currently available	YES		
2. Heavy plaque on the teeth	YES		
3. Frequent snacking (>3 times daily)	YES		
4. Hyposalivatory medications	YES		
5. Reduced salivary function (measured low flow rate)*	YES		
6. Deep pits and fissures	YES		
7. Recreational drug use	YES		
8. Exposed tooth roots	YES		
9. Orthodontic appliances			
Protective factors		Check if Yes	
1. Fluoridated water			
2. F toothpaste once a day			
3. F toothpaste 2X daily or more			
4. 5000 ppm F toothpaste			
5. F varnish last 6 months			
6. 0.05% sodium fluoride mouthrinse daily			
7. 0.12% chlorhexidine gluconate mouthrinse daily 7 days monthly			
8. Normal salivary function			
	Column 1	Column 2	Column 3

Hyposalivation
Extreme risk

The Caries Balance-Extreme Risk



Therapy for Extreme Risk: 6 year - Adult

0.12% Chlorhexidine rinse, 10 ml once daily, One week a month
PLUS Baking Soda rinse 2 teaspoons/250 ml water Ad libitum daily

Fluoride varnish Initially and at each recall/wellness 4X year

Brushing 2X daily with 5,000 ppm F Toothpaste Recall 3 months. Continue therapy at least one year Liberty 2 recalls and 2 wellness in 12 months

Caries Risk - Charles Gomez?

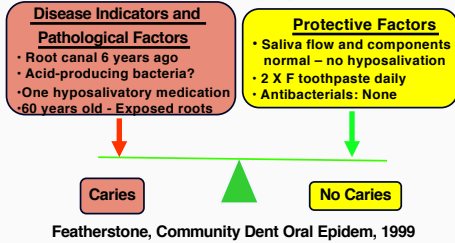


- ◆ 60 year old male
- ◆ Root canal 6 years ago. No new caries by exam
- ◆ No symptoms of salivary dysfunction
- ◆ One medication has potential dry mouth side effects
- ◆ Not a frequent snacker
- ◆ Exposed root surfaces
- ◆ Bacteria? – average OH
- ◆ 2X F toothpaste daily

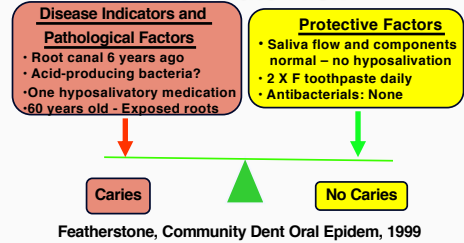
Caries risk component		Check if Yes	
Disease Indicators			
1. New cavities or lesion(s) into dentin (radiographically)			
2. New white spot lesions on smooth surfaces			
3. New non-cavitated lesion(s) in enamel (radiographically)			
4. Existing restorations in last 3 years (new patient) or the last year (patient of record)			
Biological or environmental risk factors		Check if Yes	
1. Cariogenic bacteria quantity: Not currently available	YES		
2. Heavy plaque on the teeth	YES		
3. Frequent snacking (>3 times daily)	YES		
4. Hyposalivatory medications	YES		
5. Reduced salivary function (measured low flow rate)*	YES		
6. Deep pits and fissures	YES		
7. Recreational drug use	YES		
8. Exposed tooth roots	YES		
9. Orthodontic appliances			
Protective factors		Check if Yes	
1. Fluoridated water			
2. F toothpaste once a day			
3. F toothpaste 2X daily or more			
4. 5000 ppm F toothpaste			
5. F varnish last 6 months			
6. 0.05% sodium fluoride mouthrinse daily			
7. 0.12% chlorhexidine gluconate mouthrinse daily 7 days monthly			
8. Normal salivary function			
	Column 1	Column 2	Column 3

Wish we had this

The Caries Balance – Risk Level?



The Caries Balance – Moderate Risk



Therapy for Moderate Caries Risk: 6 year - Adult

- ❖ Brush at least 2 x daily with 5,000 ppm F fluoride toothpaste and maintain other good oral health habits.
- ❖ If frequent snacker substitute xylitol gum or mints.
- ❖ Recall 4-6 months.
- ❖ Liberty 2 recalls and 1 wellness in 12 months and F varnish 3x year



CAMBRA® –PBRN Practice Based Research Network

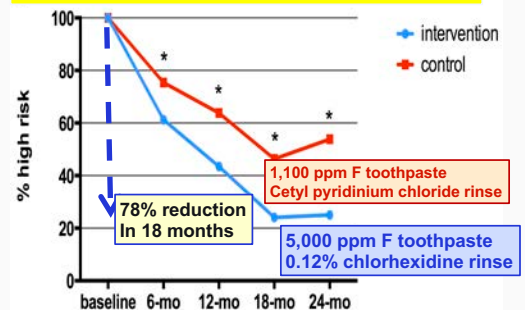
Rechmann et al, Advances in Dental Research, 2018
Rechmann et al., J California Dent Assoc, 2019

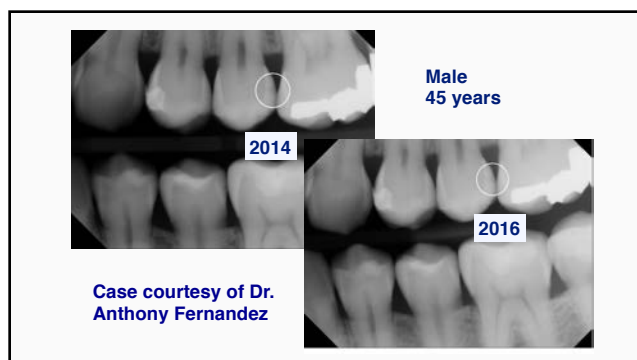
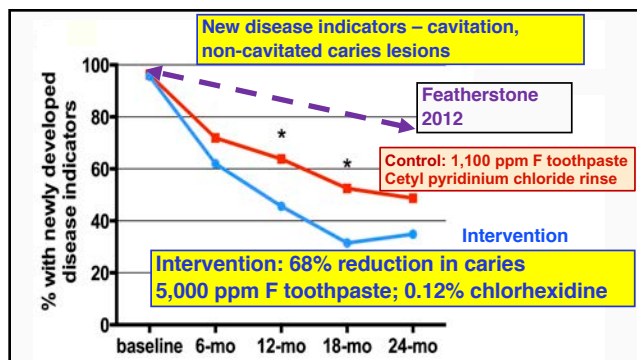


- double blind, prospective, randomized, controlled clinical study, each subject over two years
- Approved by institutional review board
 - 21 Dental offices
 - 440 subjects
 - 12 to 65 years of age

- Funded by: CDA Foundation, UCSF and Dentaquest Foundation

High risk status with time in Rechmann PBRN study





- ### Caries Management Step by Step
- All ages
- ♦ Patient/parent/guardian motivation and compliance
 - ♦ First key to success
 - ♦ Patients do not do what the doctor says
 - ♦ They need to “buy into it”
 - ♦ Home written instructions standardized for low, moderate, high and extreme risk
 - ♦ Second key to success
 - ♦ Combine with motivational interviewing and counselling.

